Criteria For Focused Data Collection

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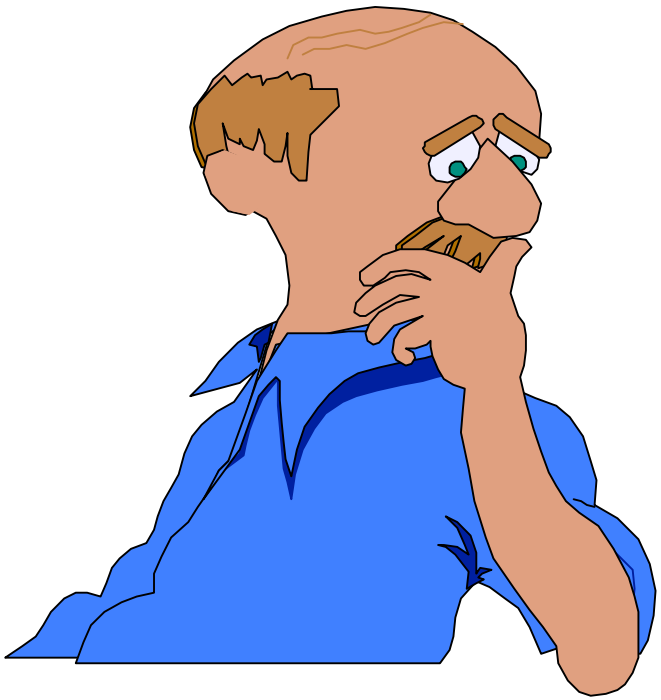
Problem Statement



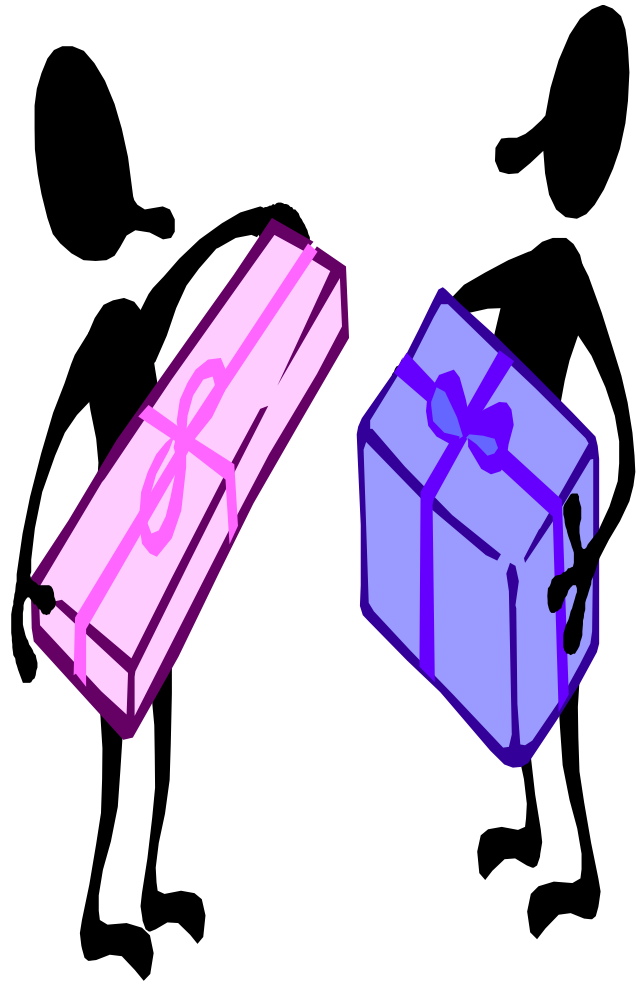
- Rigorous software quality research is hindered by a critical shortage of *comprehensive and consistent* NASA data sets.
- Rigorous research is essential to developing effective software quality and assurance guidance.

NPD 2820.1 Says: Measure ! But Measure What?

- Resources
  - Staff
  - Equipment
  - Funds
  - Legacy
  - Facilities
  - Supplies
  - Tools
  - Practices
- Activities
  - Management
  - Acquisition
  - Development
  - Assessment
  - Modification
- Products
  - Documents
  - Artifacts
- Events
  - Time Of Occurrence

Task Objective

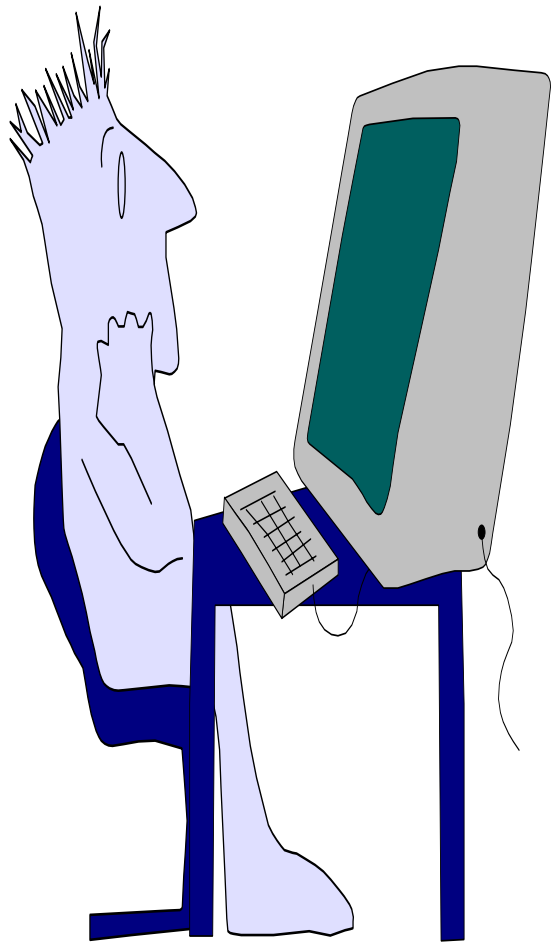
- Identify criteria for focusing data collection efforts on measures that:
  - Address priority management issues
  - Satisfy research information needs



Priority Management Issues

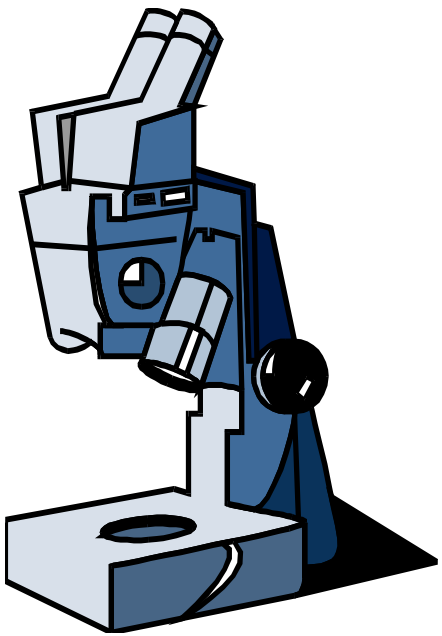
- Meeting Schedule & Assessing Progress
- Conserving Resources & Controlling Costs
- Monitoring Product Growth & Stability
- Assuring Product Quality
- Optimizing Development Performance
- Ensuring Technical Adequacy

Researchers Need Data That Is:



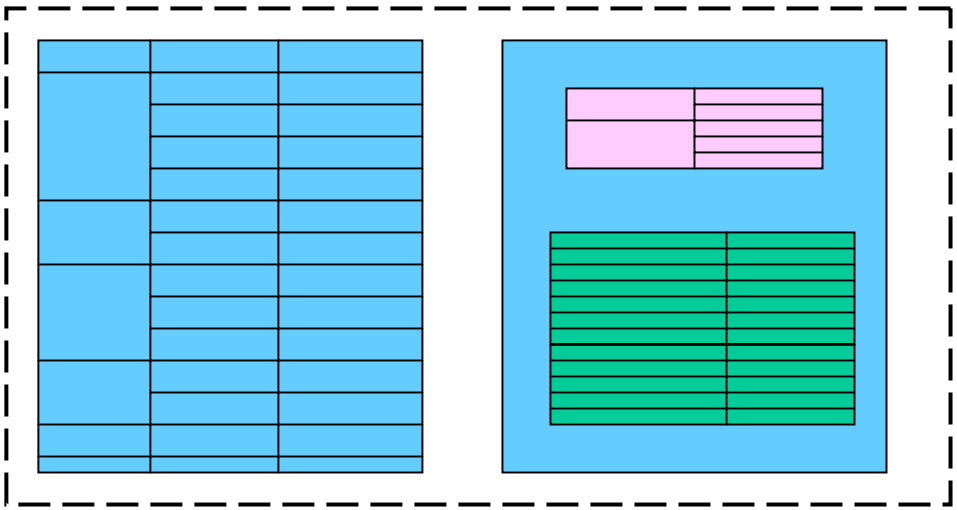
- Accurate and Unambiguous
- Orthogonal To Primary Data
- Consistent Throughout The Project
- Common Across Projects
- Defines Project And Its Environment

Task Approach



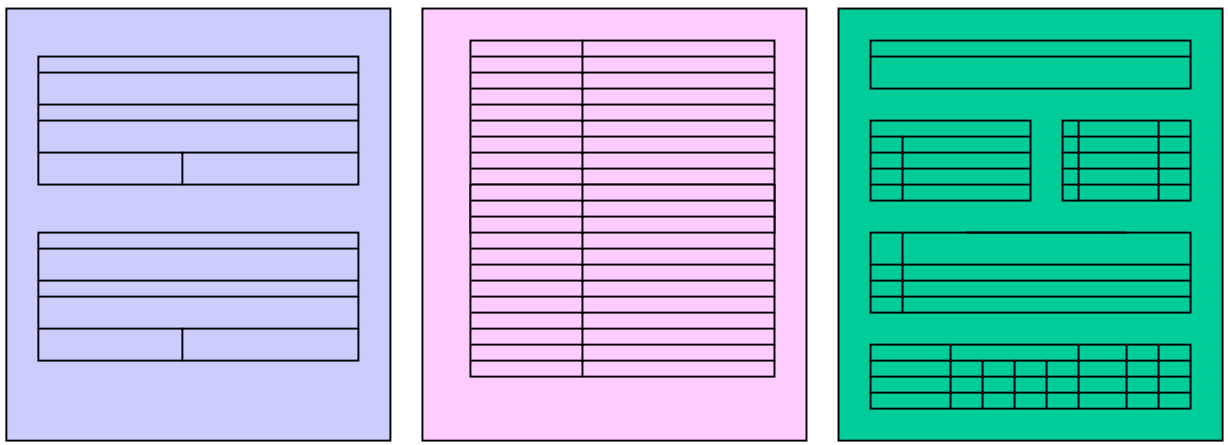
- Focus Criteria Hierarchical Structure
  - Key Project Issues
    - Key Questions
      - Measurement Categories
        - Focus Questions
          - Specific Measures
- Standard Data Reporting Forms
- **FOCUS** Tool

Focus Criteria Document Structure



Body Of Document = Tables

- Issue, Key Question, Measurement Category
- Category, Specific Measures
- Focus Questions, Specific Measures



- Appendix A
  Specific Measure Definitions
- Appendix B
  Specific Measures Versus Key Questions
- Appendix C
  Forms

Issue, Key Question, Measurement Category Table

Issue	Key Questions	Measurement Category
1. Schedule & Progress	Is the project meeting scheduled milestones?	1.1 Milestone Performance
	How are specific activities and products progressing?	1.2 Work Unit Progress
	Is project spending meeting schedule goals?	1.3 Schedule Performance
	Is capability being delivered as scheduled?	1.4 Incremental Capability
2. Resources & Cost	Is effort being expended according to plan?	2.1 Effort Profile
	Are qualified staff assigned according to plan?	2.2 Staff Profile
	Is project spending meeting budget objectives?	2.3 Cost Performance
	Are necessary facilities and equipment available as planned?	2.4 Environment Availability
3. Growth & Stability	Are the product size and content changing?	3.1 Product Size & Stability
	Are the functionality and requirements changing?	3.2 Functional Size & Stability
	Is the target computer system adequate?	3.3 Target Computer Resource Utilization

Measurement Category, Specific Measures Table

1. Measurement Category	Specific Measures
1.1 Milestone Performance	1.1.1 Milestone Dates
1.2 Work Unit Progress	1.2.1 Requirements Allocated 1.2.2 Components Designed 1.2.3 Components Implemented 1.2.4 Components Integrated & Tested 1.2.5 Test Cases Completed 1.2.6 Paths Tested 1.2.7 Requirements Tested 1.2.8 Changes Implemented 1.2.9 Problem Reports Resolved 1.2.10 Audits & Reviews Completed
1.3 Schedule Performance	1.3.1 Schedule Variance
1.4 Incremental Capability	1.4.1 Build Component Content 1.4.2 Build Function Content

Focus Questions, Specific Measures Table

1 SCHEDULE & PROGRESS	
FOCUS QUESTION	**SPECIFIC MEASURE**
Are component designs being completed on time?	**1.2.2 Components Designed**
Are components being completed on time?	**1.2.3 Components Implemented**
Are components being incorporated as scheduled?	**1.4.1 Build Component Content**
Are components passing their reviews?	**1.2.9 Reviews Completed**
Are costs conforming to projections?	**1.3.1 Schedule Variance**
Are problem reports being closed at an adequate rate?	**1.2.8 Problem Reports Resolved**
Are requirements being tested as scheduled?	**1.2.7 Requirements Tested**
Are reviews being held on schedule?	**1.2.9 Reviews Completed**
Are tests being completed on schedule?	**1.2.5 Test Cases Completed**
Has the requirements test matrix been completed?	**1.2.1 Requirements Allocated**
Have all of the paths been successfully tested?	**1.2.6 Paths Tested**
Have all requirements been allocated to at least one design component?	**1.2.1 Requirements Allocated**
Have the tests been successful?	**1.2.7 Requirements Tested**
How frequently has the schedule changed?	**1.1.1 Milestone Dates**
How likely is there to be a cost overrun?	**1.3.1 Schedule Variance**

Appendix A
Specific Measures Definition

1.1.1 Milestone Dates

Planned and actual start and end dates for individual activities and events provide status visibility of the projects working level activities. This information allows the project manager to focus attention and resources on those items that are significant or repetitive sources of delay.

Focus Questions

Is the schedule realistic?
How many activities are scheduled concurrently?
How frequently has the schedule changed?
What is the risk of not delivering on schedule?

Data Items Collected:	**Data Source/Criteria**
• Date a project milestone event is scheduled to occur • Date a project milestone event actually occurs • Number of times each event has been rescheduled • Activity/Event Name • Component ID/Name • Scheduled Start Date • Actual Start Date • Scheduled completion Date • Actual Completion Date • Responsible Organization/Individual • Dependent Activity /Event Name	• Approved Project Plan • Approved Revisions to Project Schedule • Approval Of Review Report • Closeout of all Review Item Discrepancies (RID) • Development Plans • Development Schedule Revisions • QA Sign Off • Task Completion Notice

Appendix B
Specific Measures, Focus Questions Table

SPECIFIC MEASURE	FOCUS QUESTION
1.1.1 Milestone Dates	How frequently has the schedule changed?
	How many activities are scheduled concurrently?
	Is the schedule realistic?
	What is the risk of not delivering on schedule?
1.2.1 Requirements Allocated	Has the requirements test matrix been completed?
	Have all requirements been allocated to at least one design component?
	How many requirements can be directly tested?
1.2.2 Components Designed	Are component designs being completed on time?
	Is the schedule for component designs realistic?
1.2.3 Components Implemented	Are components being completed on time?
	Is the planned implementation rate realistic?
	What components are behind schedule?
1.2.4 Components Integrated and Tested	Is integration and testing being accomplished on schedule?
	Is the planned rate of integration and testing realistic?
1.2.5 Test Cases Completed	Are tests being completed on schedule?
	Is the test schedule realistic?
	What functions have not been tested?
1.2.6 Paths Tested	Have all of the paths been successfully tested?
	How many test cases are required to completely test the software?
	What percentage of the paths have been tested?

Appendix C
Reporting Forms

Form 001 - Project Profile

Form 002 - NASA Software Description Outline

Form 003 - Staff Personnel Profile

Form 004 - Project Staff Status Report

Form 005 - Schedule Reporting Form

Form 006 - Weekly Staff Effort Data Collection Sheet

Form 007 - Staff Effort Summary Sheet

Form 008 - Product/Item Description

Form 009 - Earned Value Report

Form 010 - Development Progress Report

Form 011 - Control Progress Report

Form 012 - Software Change Request

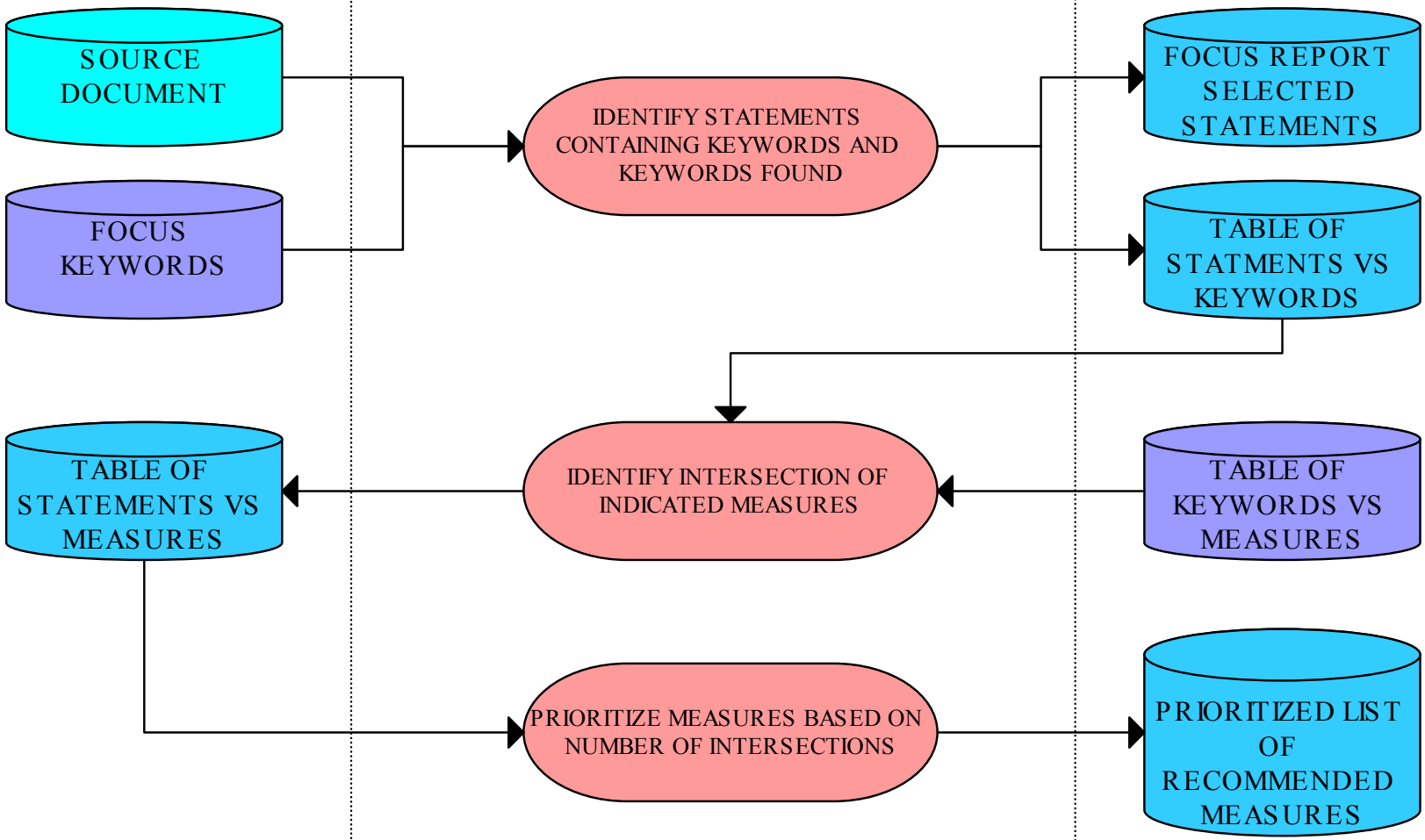
Form 013 - Problem and Nonconformance Report

Form 014 - Software Failure Report

Form 015 - Resource Management Report

Form 016 - Computer Resource Utilization Report

FOCUSED MEASURES SELECTION TOOL



Overview

- Focus scheme uses
  - 6 Common Issues
  - 17 Key Questions
  - 17 Measurement Categories
  - 148 Focus Questions
  - 51 Specific Measures
  - 16 Data Collection Forms
- **FOCUS** Tool uses
  - 275 Key Words

Summary

- Focus Scheme Documentation:
  - Complete, But Open Ended
- Focus Scheme Pilot Project:
  - In Progress
- FOCUS Tool:
  - Proof Of Concept Tests